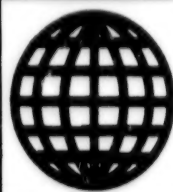


JPRS-EST-94-031  
9 November 1994



**FOREIGN  
BROADCAST  
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# ***JPRS Report***

# **Science & Technology**

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***Europe/International  
Economic Competitiveness***

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# Science & Technology

## Europe/International

### Economic Competitiveness

JPRS-EST-94-031

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9 November 1994

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### **EU Announces Advanced Communications Technologies R&D Program**

*BR2410103694 Kent NETWORK EUROPE in English Sep 94 p 10*

[Unattributed article: "Green Light for ACTS"]

[FBIS Transcribed Text] European Union [EU] research ministers have given the go-ahead to the Advanced Communications Technologies and Services [ACTS] research and development program.

ACTS, which will start in 1995 and replace the RACE [Research and Development in Advanced Communications Technologies in Europe] program, will see ECU630 million devoted to projects in developing the European information highway. The program will fund:

- interactive digital multimedia services, ECU162 million;
- development of "photonic" technologies, ECU104 million;
- "personal communications," ECU115 million
- intelligent networks and intelligent service engineering, ECU100 million
- quality, security and safety, ECU43 million

A further ECU31 million will be devoted to coordinating actions taken at the national level and ensuring compatibility, "concertation" in EU jargon, between projects in different areas of ACTS.

### **Ruberti Proposes EU Science and Technology Assembly**

*BR2010161694 Paris AIR & COSMOS/AVIATION INTERNATIONAL in French 23 Sep 94 p 9*

[Article by Framboisette Jassogne: "Brussels: Stimulating Community Research"]

[FBIS Translated Text] Antonio Ruberti, the European Commissioner responsible for research policy, has confirmed his desire to develop a genuine common European research policy. His greatest wish is to create synergies among the scientific community, industry, the member states and the European Commission.

Some Community mechanisms are already in place, such as the fourth framework program and CODEST [Committee for the Development of Science and Technology in Europe], the European Commission's current consultation forum. However, these are not enough, according to Antonio Ruberti. So the commissioner is proposing to the member states that a European Science and Technology Assembly be created, modeled on the National Research Council (NRC) in the United States and the Japan Council (JSC) in Japan. Like the NRC and JSC in their respective countries, this assembly would play an active part in defining and implementing European research policy.

Antonio Ruberti has even already defined the tasks of this new European authority. On the one hand, it would assist the Commission in drawing up and implementing the European Union's technological research and development policy. On the other hand, it would stimulate thought about science and technology matters. Finally, it would act as a guarantor. A guarantor of the appropriateness of the scientific and technological choices made, of the judicious use of funds, and of the quality of the research being carried out.

### **European Electronics Manufacturers To Solicit EU Funding**

*BR0311110794 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 29 Sep 94 pp 6-7*

[Didier Girault report: "An ECU127-Million Program for Interconnection?"]

[FBIS Translated Text] The European printed circuit, hybrid, connector and package manufacturers' syndicate will submit a project on interconnection worth ECU127 million to the European Commission in November.

Interconnection has been the watchword for the European printed circuit, hybrid, connector and package manufacturers' syndicate for over a year now. Interconnection Challenge is the name of the project to be submitted to the European Commission in November 1994 by the European printed circuit, hybrid, connector and package manufacturers' syndicate which includes members of the EECA's [European Electronic Components Manufacturers Association] Electro-Mechanical Policy Committee.<sup>1</sup> For over a year now, these syndicates have been lobbying Brussels to have their program included in the Fourth Framework Program for Research and Development (R&D). Brian Haken, head of the British PCIF (Printed Circuit Manufacturers' Syndicate), said that this three-to four-year program would need ECU127 million in funding, half of which would be provided by the European Commission (under the same funding terms as the ESPRIT [European Strategic Program for Research and Development] programs).

This program project is an initiative of SYCEP [Trade Association of Passive Electronics Components Industries]. It stems from a study launched worldwide by SYCEP at the end of 1993 "covering 123 users in various fields from the general public to the military," according to SYCEP. The project "summarizes the results of the market survey conducted by SYCEP, explains the impact of the evolution in interconnection needs on interconnection technologies and presents possibilities in terms of R&D." In the paragraph analyzing "the impact of the evolution of interconnection needs," the presentation to the Commission will list several fundamental points, including the need to reconsider training for researchers and engineers destined to work on interconnection. It recommends an essential multiskilled approach. In addition, "new products, materials and

machines will be required to meet clients' needs: cheap MCM [multichip modules], new collating and assembly machines." The presentation also recommends that companies in the interconnection field work in close collaboration with integrated circuit and equipment manufacturers. "One of the challenges that Europeans want to meet through the Interconnection Challenge is a reduction in printed circuits' track line width. We hope to reach 50 microns, or even 35 microns against the current 100 microns," said Brian Haken. "For that," he added "we need new technologies, new substrate materials, new production equipment and above all new testers... Testing is certainly the most sensitive element we have to deal with at the moment." The stakes are high because "European manufacturers supply 70 percent of the European printed circuit market while for semiconductors this figure is only 30 percent," he concluded.

#### **More Support for European Substrate and Glue Manufacturers**

Proposals for work on R&D being made to the Commission concern the integration of passive components in cheap substrates in particular for cordless telephones, the integration of filtering components for the automobile industry, the production of connectors for rapid telecom transmissions, and 3D interconnection modules bringing together sensors, connectors and packages for automobile, medical, and integrated home systems applications. The submission to the Commission also urges the setting up of specialized service support centers for the European industry so that it can offer basic materials (substrates, laminates, glue) and to help in the creation of companies specialized in design, microassembly, testing and encapsulation.

According to Brian Haken, to progress as rapidly as possible it would be best to conclude partnership agreements with the companies most advanced in interconnection "because there is no question of reinventing the wheel." In July 1993, the EECA-PCB group<sup>2</sup> organized a study visit to Japan to examine the expertise of Japanese manufacturers of printed circuits. The initial conclusions were that strictly speaking the Japanese were not technologically advanced in R&D but that they were driven by demand from the general public. Unlike Europe, they were making huge investments in the automation of their production. This massive investment was made possible by the number of medium-sized companies. There were far more of these than medium-sized European companies working in the sector and this was identified as being a major problem for Europe. In France, the industry minister is encouraging mergers stressing the commercial aspect and the development strategy of companies in bids to tender.

[Box, p 7]

#### **European Printed Circuits: A Shattered Empire**

The European printed circuit sector suffers from a dispersion of its manufacturers. In 1993, the three major

Japanese manufacturers in this field realized a \$1,300-million turnover figure and the three major U.S. companies a \$1,500-million turnover figure. The three leading European companies, on the contrary, only realized \$300 million. Where the 20 biggest Japanese companies were responsible for 50 percent of the Japanese production, the 20 biggest European companies were only responsible for 25 percent of the European production. Another example: 25 percent of the Japanese production is accounted for by 250 Nippon manufacturers, whereas 20 percent of the European production is accomplished by more than 950 companies...

#### **Footnotes:**

1. The Electromechanical Policy Committee of the EECA brings together European producers' associations in the field of interconnection (hybrids + connectors + printed circuits + packages): SYCEP (France), ZVEI [Central Association of the Electrical Engineering and Electronics Industry] (Germany), ANIEL [National Association of the Electronics Industries] (Spain), ANIE [National Association of the Electrotechnical and Electronics Industries] (Italy), Fabrimetal (Belgium) and the Dutch producers' association.
2. EECA-PCB: an EECA subgroup bringing together European printed circuit manufacturers.

#### **Dispute Delays European Fourth Framework Research Program**

BR0211140394 *Briston PHYSICS WORLD in English*  
Oct 94 p 10

[Article by Judy Redfearn: "Progress and Delay in Europe"]

[FBIS Transcribed Text] There was concrete achievement and unexpected delay to Europe's research plans last month. The first call for proposals under the 4th Framework programme went out, as planned, on the 15th of September. But the work of the European Parliament's research, technological development and energy committee—which must start off a lengthy scrutiny process of the eight remaining 4th Framework programmes—was held up by an impasse over who should be chairman.

Advanced communications and services (ACTS) was the first 4th Framework programme to issue a call for proposals. It covers the application of fundamental research to: interactive digital multimedia services; photonic technologies; high-speed networking; mobility and personal communications networks; intelligence in networks and service engineering; and quality, security and safety of communications services and systems. A work plan, setting out scientific and technological objectives and detailing specific research tasks, is now available.

A delay in finalizing the work plan of the industrial and materials technologies programme meant that it could

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do no more than call for expressions of interest. The formal call for proposals will be issued on 15 December.

The remaining programmes fall into two groups; ten that were adopted last summer by the Parliament but not the Council of Ministers, and eight that were adopted by neither. Progress of the first group could now be rapid, although training and mobility of researchers, the successor to the human capital and mobility programme, which facilitates the exchange of European researchers, could be delayed by negotiations over how to tax mobile researchers fairly. Progress of the second group, however, could be delayed by the failure of the Parliament's research committee to appoint a new chairman in time for the start of the new parliamentary term.

The committee had elected its previous chairman, Claude Desama, by a majority of one. But his appointment infringed rules which distribute key parliamentary posts between the various political groupings. The rules say the tiny Forza Europa party should have held the post, but Desama is a member of the Party of European Socialists. The result was that the committee had not been able to hold a meeting nor approve the appointment of rapporteurs to scrutinize the remaining Framework programmes. Some observers are optimistic, however, that the committee will catch up quickly once the impasse is resolved, thanks to plenty of informal work behind the scenes.

#### UK Lacks Funds for ESA Missions

BR0211140294 *Briston PHYSICS WORLD in English*  
Oct 94 p 5

[Article by Philip Campbell: "United Kingdom to Miss ESA Missions?"]

[FBIS Translated Text] The UK [United Kingdom] may have to scrap its involvement in the European Space Agency's gamma ray astronomy mission, Integral. A programme review last month by the UK's Particle Physics and Astronomy Research Council [PPARC] revealed that without additional funds from the government, only a fraction of the 15 million pounds needed for payload projects would be available. Involvement in the subsequent cometary mission, Rosetta, is also threatened.

"This would be the first time since ESA was founded that the UK was not able to play a full part in the space programme and thus exploit its subscription," said PPARC's chief executive, Ken Pounds. "On current funding we might be able to make a small contribution, but many of us feel strongly that higher priority should go to getting the most out of our investment in past and current missions."

Many of the UK's major space astronomy groups have an interest in Integral's gamma-ray, X-ray and optical detectors. The deadline for bids for payload instrumentation is the end of this year, with a launch due in 2001.

The potential impact on the Integral mission is uncertain, and depends on the financial situation in other countries. Germany and Italy in particular may also be unable to commit significant funds, which would result in Integral being delayed, and possibly cancelled. But some member states maintain that ESA itself needs to reduce its costs drastically. Suggestions include scrapping its *juste retour* system for allocation of industrial contracts by, for example, reducing its dependence on Ariane launches and using cheaper options elsewhere, and by internal (rather than industrial) "prime contractor" management of its missions.

PPARC's problem has emerged at a time when the council is competing with other research councils for funds from the Office of Science and Technology, which itself is bidding to the Treasury against other government departments in the run-up to the budget statement on 29 November. The distribution of the UK science budget is expected to be announced in December.

A PPARC panel of astronomers has also proposed that the UK's observatories on La Palma and Hawaii should be given much greater autonomy, and that a single R&D centre for telescope instrumentation should be established in the UK. The proposal will be debated by PPARC early next year.

#### Germany: BMFT Presents Advanced Materials Program

MI0710143294 *Bonn TECHNOLOGIE-NACHRICHTEN PROGRAMM-INFORMATIONEN in German* 10 Aug 94  
pp 2-12

[FBIS Translated Text]

#### Materials for Key Technologies

The production and processing of high-performance materials for innovative applications are taking on great importance at the international level in view of their enormous significance for the development of many branches of industry and technologies. Firms in almost all sectors of industry see opportunities here for the acquisition of advantageous technological positions that will ensure their international competitiveness. Materials research and development thus have priority in all leading high-technology countries.

The contributions made by new materials range from the raw material and power-saving production of materials and their processing into components, through their profitable application in improved or new systems, to their re-exploitation or recycling after use. This also includes aspects of health and safety, not least in the workplace.

Using extremely high-strength, durable materials, for example in power station engineering or in engine and turbine building, makes for savings in natural sources of energy and considerable reductions in specific power

consumption and pollutant emissions. Energy and transport systems can operate more economically and achieve greater environment compatibility by exploiting lightweight construction potentials and optimized design. The same goes for improved or new functional materials when used in novel energy conversion and storage systems, in sensors, actuators, and automatic control systems. In this context, new high-performance materials have a key function for a wide variety of technical innovations.

Materials research requires long-term scheduling and is industry-centered, with preliminary research at the universities and nonuniversity institutes. Public funding of materials research and development involving a high level of scientific and technical or economic risk is justified by the enormous benefits that use of the new materials brings for the national economy and which are greater than the benefits that accrue to the private companies concerned.

#### Program Goals

The primary goal of Federal Government research policy is to support research and development as a means of improving national technological competitiveness as a basis for knowledge-based industrial and economic success achieved with innovative, resource-saving, environment-compatible technology and the supply of goods and services. The acquisition of a leading technological position in the production and processing of new materials for applications in key technology fields plays a major role in this respect.

The technology-specific measures adopted by the BMFT [Federal Ministry for Research and Technology] are based on the principle of subsidiarity, i.e., state research funding takes over at the point where overriding economic or social considerations render support for research and development in private industry necessary.

The "New Materials for Key 21st-Century Technologies"—MaTech—program is tailored to the future needs of the material-using industry. It sets out to promote middle- to long-term materials research and development targets entailing a high level of scientific and technical or economic risk while holding out high innovation potential in the event of success.

The scope of the program ranges from [academic] basic research through industrial basic research to applied R&D, right up to the demonstration in principle of the technological viability of new materials. The main emphasis is on industrial basic research.

The R&D topics focus on fields in which applications for new materials act as pacemakers for economically significant technological developments.

Joint projects undertaken by relevant, productive research institutes and industrial companies operating and/or expanding on international markets will take account of the steps involved in the creation of added

value, the system-oriented approach, and long-term ecological aspects. The exploitation of resource-saving and environment-compatible effects is thus an integral feature of the program.

The development of new materials, the exploitation to the full of the still considerable potential held out by known materials, and both the production and the processing of these materials all enjoy equal status as program goals. Program Topics

After thorough consultation with numerous experts from industry and science, five key technology fields were identified where the production and processing of high-performance materials may be regarded as pacemakers and prerequisites for promising technological developments. The following funding topics for the "New Materials for Key 21st-Century Technologies" program have thus been established:

—Research and development on the production and processing of new materials for future applications in:

- information technology;
- power engineering;
- transport technology;
- medical technology
- production engineering

—Multimaterial and multitechnology projects and new fields.

In particularly deserving cases, materials science and technology projects from other potentially significant fields of technology will also be funded under "new fields." The intention behind focusing the program on these six topics is to concentrate R&D resources and to deploy state funds to the very best advantage.

New high-performance materials that boost technological development or open up new technological fields stand out for their improved or novel structural and/or operational properties, often having highly specific performance profiles for the application concerned. This does not apply only to "new" materials: The performance potential held out by what are regarded as "conventional" materials is often far from exhausted and must be further tapped for practical application.

This applies to all materials—mutually competitive ones included—to metals, ceramics, polymers, and composites, to monolithic materials, coatings, and conditioned surfaces. Their potential can often not be fully exploited merely by substituting one material for another; optimum solutions to problems can often be found by devising the right structural techniques for the material, its use, and the test procedures involved. Last but not least, lowering production costs is often of crucial importance for use in actual practice. When forging ahead into new technological territory, R&D work may be required right up to the prototype and/or pilot phase in order to generate sufficient thrust to carry R&D results over into practical application.

The technical targets to be met by new materials for future applications in key technologies include:

- particular optical, electrical, magnetic, and mechanical functions;
- specific properties as sensors;
- high resistance in extreme conditions, at high temperatures, and in corrosive media;
- high rigidity combined with the lightest possible weight;
- high degree of hardness and abrasion resistance;
- combined property profiles achieved via graded structuring;
- systematic building up of materials from micro- and nanostructures;
- multifunctionality, biomimetic structures and production processes;
- application-specific biocompatibility;
- improved, economical processing and process engineering;
- material- and application-specific modeling and simulation;
- higher degree of process safety and reliability achieved with tried and tested fault diagnosis procedures;
- reuse or recycling to the greatest possible extent.

#### Funding Strategy

The "New Materials for Key 21st-Century Technologies" program is primarily being implemented in the form of direct project funding measures with precisely defined funding goals and criteria designed to direct funding toward particular focal points. Applications for project funding under the program can be made at any time.

The intention is to take requirements stemming from subsequent application in systems or components into account from the moment of conception onwards. Materials, with their technological key functions, often have only a minor share in the overall value addition chain—from the production of the material to its processing into semifinished products and components, right up to the latter's use in systems—and, as far as particular functional materials are concerned, are not bulk products. As a motivation for long-term R&D by material producers, therefore, new forms of cooperation with various partners along the value addition chain must be developed in research consortia.

In this connection, the BMFT primarily takes on the role of catalyzer in order to foster the research and development fields that science and industry regard as holding out major opportunities for product innovation.

The funding model is joint research, i.e., coordinated, work-sharing cooperation among R&D partners from industry and research facilities, university departments, Max Planck, Fraunhofer, and Blue List institutes, the national research establishments, and the Federal Government's research facilities.

A decisive factor in future joint projects between private industry and institutional research is that the industrial partner should be in overall charge.

Depending on the extent to which the projects involve pure research, their level of innovation, their multidisciplinary nature, their long-term nature, and their distance from practical application, the funding strategy makes it possible to fund various types of project consortia as set out below.

The industrial partners in a research consortium—with or without the participation of research institutes—work on industrial basic research projects (often of a cross-sectorial nature) and applied research and development. Overall responsibility for industrial joint projects lies with one of the industrial partners. Material manufacturers, processors, and users work together at various process and value addition stages in vertical consortia, whereas horizontal consortia have potential competitors working jointly with institutes, the primary focus being on cross-sectorial aspects of individual value addition stages.

Development consortia will carry out applied R&D projects that set out to speed up the development of products of medium-term market relevance.

The institutes in research consortia work mainly on fundamental long-term topics with a high commercial potential that mark the very beginning of an emergent technological trend. These long-term projects focus on the acquisition of basic knowledge capable of leading to productive applications in various sectors of German industry within a period of 10 years or more. Industrial partners are involved in the conception of these projects and in providing specialist support.

Special projects with a high degree of innovation will provide a channel for funding unorthodox developments that nevertheless represent a long-term practical proposition. The spectrum ranges from particularly innovative individual projects to "limited-term R&D teams" bringing together eminent scientists from research and industry to work on areas of strategic importance.

A strategically inspired research policy must aspire to an efficient dovetailing of institutional and project-specific research. Synergies will be fostered through careful coordination of this program's funding measures with institutional research work. This requires smooth coordination, in particular with the materials research-relevant work performed by the national research establishments and the Blue List institutes.

The program takes account of the peculiarities of materials research and the long time that R&D results take to seep through into industrial application in this field, with a timeframe adequate for the performance of long-term R&D projects. The program will be assessed after five years, and the findings from the assessment will be taken into account in subsequent funding measures.

Subject to future budget decisions, medium-term financial planning allocates the funds for the "New Materials for Key 21st-Century Technologies" (MaTech) program, expressed in millions of German marks [DM], as follows:

1994 .....	130;
1995 .....	130;
1996 .....	135;
1997 .....	141;
1998 .....	145, and
1999 .....	149.

Of these sums, about 70 percent of the funds are earmarked for the industrial and development consortia that will make up the bulk of the program, about 30 percent being budgeted for institute consortia and special projects.

The program will be conducted, steered, and implemented in close coordination with the relevant research sponsored by the Federal Government, the federal laender, and the Commission of the European Union via an efficient R&D controlling and project management system.

#### Outline of Application Procedure

##### Notes for Applicants

The calculation of grants is subject to restrictions pursuant to Art. 92 of the EEC Treaty, which sets out the common framework for state R&D subsidies (86/C83/02), and the administrative practice of the EU Commission. As a result, the following maximum funding rates for projects assessed on a "cost" basis apply to private companies:

- up to 50 percent for industrial basic research;
- up to 25 percent for applied research and development, plus
- a funding preference of up to 10 percentage points:
- where applicable, when the project involves a very high specific risk;
- for firms that have a work force numbering no more than 250, that either have an annual revenue not exceeding ECU20 million or show a balance not exceeding ECU10 million, and in which a major company has no more than a 25-percent holding (SME [small or medium-sized enterprise] as defined under EC subsidy law);
- for projects performed in the accession area (probably up to and including 1996)

The funding preferences for accession area and SME projects may be accumulated up to a maximum of 15 percentage points.

University and research institute projects assessed on an "expenditure" basis are subject to special funding quota rules.

The Materials and Raw Materials Research (PLR) Project Manager, Juelich Research Center GmbH (KFA), P.O. Box 1913, 52425 Juelich, tel. 02461/61-4891, fax 02461/61-2398 is responsible for the preparation and implementation of the funding measures under the "New Materials for Key 21st-Century Technologies" program and will supply detailed application documents.

The project manager also supplies advice to applicants with regard to the formulation and drafting of funding applications under the program. Prior to filing a formal application, therefore, contacting the project manager is always recommended.

#### Visions of Products and Applications for New Materials

"Rechargeable polymer batteries with energy densities of 400 Wh/i," "electronic devices with nonlinear optical effects of the third order," and "ceramic turbine components operating at temperatures in excess of 1,400°C and presenting regenerative properties against crack formation or corrosion" are examples of material developments that will already be available by 2009, according to the 1993 German Delphi Report (German Delphi Report on Scientific and Technical Development, published by the BMFT, Bonn, 1993). Although these innovations still sound incredible to many a materials expert, they show the great hopes and expectations attached to future materials, particularly in the light of the enormous value that they will add in component and system production.

The above examples also point to the progressive specialization taking place in material development, which will adhere closely to specific component requirements in the future. In addition to the materials called for on the demand side, completely new classes of materials are constantly emerging, such as fullerenes, high-temperature superconductors, and smart materials, with which new technologies can be opened up once their specific property profiles have been elaborated.

These also include materials that have only existed to date on paper: A futuristic carbon nitride ( $C_3N_4$ ) is thought to have very strong atomic bonds giving a hardness greater than that of diamond. The predicted electronic properties of the superhard substance,  $C_3N_4$ , predestine it for use as a high-temperature or high-performance semiconductor. To take things to their logical conclusion, in the distant future it will be possible to put materials with specific properties together and read off their synthesis pathways on screen, using purely theoretical computer simulations.

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It is thus a primary concern of the MaTech program to take up material developments with an innovative content in terms of basic principles, even though they may initially appear purely speculative and visionary.

The visionary product and application concepts set out below derive from, among other things, current development trends in the various classes of materials and, in the light of the high degree of uncertainty surrounding them, are presented without prospective dates for their actualization. Uncertainty as to their conversion into marketable products also stems from the unpredictability of scientific and technical obstacles, cost factors, the potential of competing materials for replacing one another, and also from legislative measures; for example, limits imposed on traffic emissions, such as those in force in the United States, can substantially speed up the development of innovative batteries for electrotraction.

Alongside the general trend—stronger, tougher, lighter, and more heat-resistant—system-creating functional materials in all classes are acquiring increasing importance. Targeted material and process steps have to be used here to separate out the identifiable properties and, often, turn them into miniaturized devices.

Information technology in particular will benefit from the introduction of new materials: A new generation of wide flat screens, storage systems with even higher capacities, and waveguides with transfer rates up to 100 Gbit/s are indispensable components for the next generation of communication systems. Information processing, in conjunction with sensor and actuator engineering, will be increasingly used in traffic control engineering as well. Intelligent engine management comprises, for example, in-engine sensors that register the

combustion parameters at high temperatures and directly control the ignition and injection system. Whether the fully ceramic engine is a sound proposition in thermodynamic terms is open to doubt, but ceramics will nevertheless maintain and consolidate their innovative position in engine and propulsion technology.

New power engineering strategies rely on ceramic turbine vanes and single-crystal turbine rotor blades made of (coated) superalloys or intermetallic alloys. These material developments will help combined (gas and steam) power stations reach efficiencies of 60 percent and more, which in turn will save fuel and reduce pollution.

Wherever industrial systems still rely on complicated and costly control units for optimum operation, there is a call for multifunctional (intelligent or adaptive) materials capable of reacting autonomously to a changing environment, recognizing their load limit, and exercising self-healing capacities. Introducing these materials will not only raise safety standards but will also contribute to a substantial simplification in control mechanisms.

Nearly all material developments help operate industrial systems more efficiently thanks, for example, to lightweight construction, higher power density, and miniaturization, and economize on resources and power consumption, thus assisting German industry to comply with the ecological requirements that it is called on to meet. The environmental impact stated in the following tables often stems from the use of new materials in advanced systems.

Application:	Information technology	Power engineering	Transport technology	Production engineering	Medical technology	Environment (impact)
New technology						
Intermetallic alloys, superalloys		Very high-stress turbine parts	Parts for next engine generation			Efficient power generation creates less pollution
Nanomaterials	Molecular switches, electron guides at molecular level, pocket libraries, quantum electronics	Ceramic nanocomposites for turbine parts				Increase in power generation efficiency
High-power magnets, magnetostriectors	Novel information storage systems, microswitches	higher-capacity generators, fast output increase	Magnetic railway parts, compact engines			Optimized controls make for lower pollutant discharges
Multifunctional, adaptive materials	Adaptive optics	Self-optimizing and self-healing components		Smart tools	Release according to need from medication implants	Safety, durability
			smart shock absorbers			
Shape memory materials	Microactuators	Low-power control elements	maintenance-free temperature controls	Component/tool connectors		Power-saving

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Application:	Information technology	Power engineering	Transport technology	Production engineering	Medical technology	Environment (impact)
(continued)						
Aerogels	Coating for fiber-optics	Superinsulation in heat technology, transparent glass insulation	Noise abatement in high-speed trains			Power-saving, resource conservation
Biomimetic materials	Nonlinear optics using nanostructured materials	Nanocomposites combining extreme toughness with low weight obtained by biological mineralization			Artificial skin, dialysis membranes, artificial organ parts	Abundant supply of raw materials
Structural ceramics and mechanically resistant materials	Transparent ceramics for lenses with high mechanical loading capacity	Ceramic turbines, ceramic bearings, coated turbine blades	Ceramic engine parts, self-lubricating friction pairings, Si <sub>3</sub> N <sub>4</sub> bearings	Damage-tolerant tools, SiN bearing materials, cutting tools, tools harder than diamond	Long-term implants, prostheses	Higher power generation efficiency, membranes, sensors, absorbencies
Functional and piezoceramics	Microsensors and actuators, AlN as substrate for high-power electronics	Exhaust gas sensors, system monitoring	Health monitoring, in-engine sensor systems		Neurostimulation of paralyzed limbs, heat treatment of tumors using implanted, magnetically excitable ceramics	Exhaust gas sensors, power-saving via optimization of industrial systems
Polymers	Optical computers, refractive color systems, organic conductors, wide flat display screens	Low-loss circuits	Lightweight batteries, electroluminescent polymers for vehicle lighting		Optimum dosing of medication, skin grafts, biological membranes	Raw material, fuel conservation
Optical/photonic materials	Up to 100 Gbit/s waveguides, micro-databus in the chip, optical semiconductors, optical storage elements	Effective energy converters	Large-scale polymer light diodes, control systems, signal routing systems		Highly sensitive materials for reducing radiation exposure	On-line pollutant probes
High-temperature semiconductors (SiC, CBN, C <sub>3</sub> N <sub>4</sub> )	Flat display screens, high-power electronics, active and passive devices			Coated cutting tools		Long service life conserves resources

### Innovation Potential of New Materials—Selected Examples

#### 1. "Intelligent" Materials That Record, Switch, and Regenerate Themselves

Over the last few years, factors including advances in analysis technology have greatly heightened interest in biological materials and structural principles, as nature offers innovative solutions for numerous technical problems. Biological structures and materials present a decisive advantage over all synthetic materials in the conventional sense: They have the ability to react to external influences and to adapt to a changing environment. The obvious option is now to transfer this behavior of nature's, which borders on "intelligence," to synthetically produced materials by technical means.

There are already a number of nascent intelligent (multifunctional, "smart," or adaptive) materials capable of reversibly altering their properties in a defined manner, for example:

- piezoelectric ceramics with sensing and actuating properties;
- plastics that expand in response to an increase in temperature and contract again when the temperature falls (artificial muscles);
- electrorheological fluids that solidify at the press of a button (electrical field) and can thus be used for clutches or absorbers in transport technology;
- electrochromatic glass ("smart windows") with adjustable transparency for solar facades and vehicle and greenhouse glazing.

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Several developments are directed toward endowing materials with self-diagnosis or warning functions to enable them constantly to monitor the operating state and safety reserves of a component. Self-healing structures after the pattern of callous formation following damage to trees are also conceivable.

As in nature, the production and processing of these materials with "built-in software" require an almost perfect mastery of their inner structures on an atomic and/or molecular scale. However, the enormous outlay involved in developing intelligent materials is justified by the high economic and ecological value that they will build into future industrial system solutions.

In addition to functional aspects, nature also teaches us to handle raw materials sparingly: complex biological processes turn simple, abundantly available raw matter into high-grade materials, such as mussel shells or gossamer thread, the distinguishing features of which are high strength and toughness and enormous elasticity combined with low weight. The chitin armor of insects, which consists of a protein matrix in which chitin microfibrils are embedded, is also of technological interest. The diameter of a single chitin fiber measures only 10 nanometers, whereas industrial composites present fibers 100 times thicker. Chitin is also extraordinarily strong: about 400 percent stronger than the best steel.

The production of lightweight components from fiber-reinforced composites often raises the question of the optimum fiber orientation in relation to the geometry of the component and the stress that it will have to withstand. Computer simulation of a similar wood fiber process, using computer-aided biomechanics, can supply the strength- and weight-optimized fiber arrangement for the synthetic material.

## 2. Aluminum Nitride With High Heat Conducting Capacity

In addition to enhanced electronic peripheral equipment, the increasing power of electronic devices for applications in information, communication, transport, and control technology primarily requires a higher heat exhausting capacity. The existing cooling systems (secondary measures) are economically and ecologically unsatisfactory, and there is a demand for materials with a higher heat conducting capacity instead.

Despite its very high heat-conducting capacity (270 W/mk), beryllium oxide's toxicity means that it can be used only by a very limited market. Little can be done to raise the comparatively low heat-conducting capacity of aluminum oxide (20 W/mk), the substrate that dominates the market on account of its good cost-benefit ratio. In the seventies, heat conductivity figures of about 250 W/mk for aluminum nitride monocrystals suggested that this material class had potential, but only a modest 20 W/mk has been measured in the polycrystalline aluminum nitride materials of relevance to industry.

It has only been through systematic material and process developments devoting the necessary attention to, in particular, the role of oxygen and other impurities in the aluminum nitride microstructure that values rising to just under the theoretical 320 W/mk have been achieved. Applications of industrial and economic relevance require 170 W/mk, and devices meeting this requirement are now supplied by German firms. In addition to its main area of application as a substrate for power electronics (e.g., for IGBT's [isolated gate bipolar transistors] and high-frequency applications in the GHz range, the market for three-dimensional cooling systems is not to be neglected. If aluminum nitride cooling modules of this type are incorporated into power thyristors in electric locomotive control systems, the polluting coolant PCB [polychlorinated biphenyl] can be replaced with water.

## 3. Highly Flexible Silicon Nitride

Of ceramic materials, silicon nitride ( $\text{Si}_3\text{N}_4$ ) presents the best high-temperature strength properties, which, at temperatures of more than 900°C, exceed those of conventional metallic materials. Moreover, silicon nitride is lighter than these metallic materials and thus holds out high potential for applications in the form of moving components in transport and power engineering, and in engine and turbine construction in particular.

Mastering the process technology involved in producing components, and not just specimens or sample parts, with these properties out of silicon nitride required systematic R&D efforts on the part of all concerned. Material and process developments with a bias toward series manufacturability were thus undertaken on a work-sharing basis in joint projects undertaken by raw material, material, and component producers and users in the light of previous research work carried out by institutes. In this way, one material-specific process line and material-specific design after another were achieved and the gap with the Japanese was closed up, even in respect of strength values.

## 4. High-Performance Materials for Fuel Cells

If environmental pollution and fuel consumption are to be reduced, the efficiency of conventional power stations must be enhanced and existing power-generating processes increasingly replaced with high-efficiency, low-pollution technologies. Fuel cells meet the demand for high efficiency and environment-compatible operation significantly better than the power generation processes currently in use (steam and gas turbines and gas and diesel engines). Fuel cells, which come in low- and high-temperature versions according to the requisite operating temperature, are expected to be used for a broad range of applications, from power stations to transport technology.

Fuel cells convert energy released as combustion heat in other chemical reactions directly into electricity without

going through the mechanical work stage. The high-temperature solid ceramic fuel cell (SOFC, or solid oxide fuel cell) is ideal for supplying power up to about 40 MW on a decentralized basis to residential and industrial complexes, can be fed with, for example, methane at the anode and atmospheric oxygen at the cathode, and be operated as a continuous electricity generator. Oxygen or hydrogen ions provide charge transfer between the electrodes, at which an electrical potential is created, as in a battery. Depending on the size of the complex concerned, the target is 50- to 65-percent electrical efficiency and over 70-percent waste heat utilization, substantially higher than the parameters achieved with modern combined gas and steam power stations.

With a view to raising reliability and long-term stability and reducing costs by using economical materials for external auxiliary units, the current target-operating temperature for oxide fuel cells will be lowered from about 950-1,000°C to 750°C. This will continue to allow effective waste heat utilization while at the same time reducing corrosion and abrasion damage, as a result of which cheaper materials can be used for the secondary components despite more protracted use.

Material and process developments on ceramic solid electrolytes and on electrodes aim to raise ion conductivity and, consequently, efficiency despite the lower operating temperature, and to lengthen component service times. New anode materials will also have the advantage of integrating the reforming of the fuel gas, e.g., methane, which previously had to be performed externally, into the fuel cell.

#### 5. Light-Conducting Polymers

The use of light signals to exchange information (fiber optics) is acquiring constantly growing markets in communications.

However, at short-range level (offices, factories, audio and video, automobiles) glass fibers have not succeeded in establishing themselves against copper cables for reasons of cost. Conventional copper cable harnesses in motor cars can weigh up to 50 kg. The polymer waveguide made of organic polymers (with a 1-mm core diameter) holds out technical and system advantages here owing to its lower weight, greater ease of processing, lack of susceptibility to vibration stress, and greater flexibility combined with larger fiber diameters. The greatly simplified wiring also brings a marked price advantage in the construction of a data transfer system, as the material's high flexibility means that even polymer fibers a millimeter thick can be used, which in turn means that the fibers can be coupled and the optoelectronic transmitters and receivers hooked up even without precision alignment. The optical transition contact surface is up to 400 times greater than with glass fibers and, what is more, unlike brittle glass fibers, plastic fibers require only minimum reinforcement with supporting and strain-relieving elements. This mechanical sturdiness is now opening up new opportunities,

particularly in areas where strong vibrations previously gave waveguides no chance, in automobiles, for instance. The waveguides currently available on the market, such as polymethyl methacrylate (PMMA), polycarbonate (PC), and polystyrene (PS), still present two serious drawbacks: excessive optical loss (approximately 200 dB/km) and insufficient heat resistance (about 80°C). The material development target is low optical loss combined with continuous operating temperatures of 150 to 200°C.

One area of application is the automobile, where many electronic systems, such as ABS [antiskid systems], engine management, electric motors, lighting, dashboard instruments, etc., all have to be accommodated in the minimum space. An automobile polymer fiber-optic system controls all systems at once in network instead of every electrical system singly and independently, as was previously the case, a central computing unit converting the driver's control commands with a high level of reliability and operating safety into mechanical, optical, or electrical functions according to a given protocol.

#### German Research Ministry to Promote Software Development

95WS0012B Munich ELEKTRONIK in German  
20 Sep 94 p 8

[Article: "Federal Government Becomes Active"]

[FBIS Translated Text] The Federal Minister for Research and Technology, Dr. Paul Krueger, wants to do more to promote software technology in the form of an initiative. The plan was set up on the basis of a study by the Society for Informatics (GI) in cooperation with the Central Association of the Electrical Engineering and Electronics Industries (ZVEI) and the German Machine and Plant Construction Society (VDMA).

By now the sparrows are proclaiming it from the rooftops: software is becoming more and more important. Even today 47 percent of the European market for information technology is in software products, and the trend is increasing. In the communications technology of telecommunications plants, software already accounts for 80 percent of manufacturing costs, and in CNC [computerized numerical control] mechanical engineering for about 50 percent; this percentage is constantly growing.

The subsidy plan is intended to contribute to strengthening the competitiveness of the German economy in the field of software development. In particular, the plan is to improve the ability to master large applications software systems. For the years 1995-1998, an initial 30 million German marks annually is planned for research and development projects, with the BMFT [Federal Ministry for Research and Technology] providing half that amount. Support is to go primarily to joint projects between research groups from the business economy—both developers and users—and from research institutes

and universities. Technical supervision should generally be provided by the partners in the business economy, in order to investigate questions relevant to a majority of them which emerge from practical problems of application. On the other hand, ensuring the general availability of the knowhow accumulated, even after the end of the project period, is predominantly in the hands of the research institutes. For small and mid-sized companies funding will be increased by 10 percent, and projects with short-term and intermediate goals will be offered. Further information is available from:

Professional Association for Information Technology in the VDMA and ZVEI, Lyoner Strasse 18, 60582 Frankfurt, Telephone: 069/66 03-530

#### **Germany: Deutsche Telekom, GMD Intensify Cooperation**

MI3110141994 Bonn *TECHNOLOGIE-NACHRICHTEN*  
*MANAGEMENT-INFORMATIONEN* in German  
18 Sep 94 p 7

[FBIS Translated Text] Telekom and the Society for Mathematics and Data Processing Ltd. (GMD GmbH) are intensifying their cooperation in research and development. This is provided for in a cooperation agreement signed on 12 September in Bonn. The agreement will come into force on 1 January 1995 and will run initially for five years, with the option for renewal. The plan is for orders worth at least 10 million German marks per year to be placed through Telekom research with GMD for the FOKUS Institute (Institute for Open Communications Systems).

The joint research activities include ATM [asynchronous transfer mode] technology, multimedia teleservices, network management systems, and system-independent communications platforms. The GMD's FOKUS Institute in Berlin is concentrating on the following areas:

- Research and development of network services and their integration;
- Research and development of new teleservices;
- Research and development for the management of network structures and distributed services and applications;
- Research and development for systems integration and evaluation and telecommunications methodology.

An advisory board on which all parties are equally represented works out strategies and plans and approves them. It has a representative of the land of Berlin as a guest.

#### **German Society for Microelectronic Applications Profiled**

95WS0012A Munich *ELEKTRONIK* in German  
20 Sep 94 p 108

[Article: "Who and What is DFAM?"]

[FBIS Translated Text] The German Research Society for Microelectronic Applications [DFAM] e.V. was

founded in 1990, partly at the instigation of the German Machine and Plant Construction Society (VDMA), the Fraunhofer Society (FhG), and various small and mid-sized companies from different branches of industry. The goal of the research society is to stimulate and encourage joint industrial research in the field of micro-electronic applications.

The planning group of the DFAM worked out thematic focal points in June of 1994, starting from emerging global conditions of the future:

- globalization of competition;
- shorter innovation and technology cycles; extension of useful life of products and components; increased dovetailing between technological fields as complexity increases.

In the DFAM and within the framework of joint industrial research, systems manufacturers and function providers are the ones who need to join forces to solve difficulties in microelectronic applications. Joint industrial research for small and mid-sized businesses (KMU) has subscribed successfully to this "bottom-up method," and the DFAM is here challenging all branches of industry to use the platform created here to carry out joint research projects in microelectronic applications based on the stated thematic focal points.

Contact person: DFAM Business Office, Herr Zimmer, Telephone: (0 69) 03-3 15, Fax: (0 69) 55 03-6 73

#### **Uses and Costs for Participating Companies**

The mid-level manufacturer is in a dilemma. On the one hand, he does not produce the large inventory which is generally needed to be considered an interesting customer for large manufacturers of control systems and electronic components. On the other hand, he is also not necessarily in a position to manufacture his own control systems at a feasible cost. Thus mid-level plants which offer classical mechanical engineering and classical electronics stand in need of advice and help in order to help themselves. There is hardly anything more suitable for this purpose than practically-oriented research institutes, which also work in the area of contract research, often on a large scale. Institutes with which the DFAM is currently working closely include:

- the Fraunhofer Institute for Integrated Circuitry in Erlangen;
- the Fraunhofer Institute for Microelectronic Circuits and Systems in Duisburg;
- the Institute for Applied Microelectronics in Braunschweig;
- the Institute for Microelectronics in Stuttgart;
- the Institute for Microtechnology and Information Technology in Villingen-Schwenningen;
- the Microelectronics Center in Dresden;
- the company GEMAC GmbH in Chemnitz;
- the company Thesys GmbH in Erfurt.

Among other things, the DFAM can also conduct joint industrial research with these institutes. This means that industrial microelectronics users will find a broad palette of suitable research institutes in the DFAM, where projects which are of interest to a large number of user firms as the basis for their own developmental work or as a basis for the developmental work of important suppliers can be worked on as a joint research project.

As discussed in the first meeting of the advisory board, possible projects might include:

- Requirements and conditions for a CAE [computer-aided engineering] working environment;
- universal software for the design of programmable logic, including integrated client circuits; sensor buses; semiconductor sensors for mechanical engineering

Any company participating in DFAM can suggest similar research projects. They will be tested in discussion groups and in the advisory council to see if they may be of interest to a greater number of participating companies. If this is the case, research projects can be created whose results not only flow back into the participating companies, but also put the institutes conducting the research into a position to be particularly good advisors to industry in particular cases because they are armed with even more information.

Besides this right to make suggestions, participants in DFAM also have a right to be represented in the working groups of the joint projects which are of interest to them by an in-house expert, and thus to keep drawing new knowledge from the projects.

The intermediate and final reports with the detailed results of the research projects will be available only to the participating companies. Along with these advantages, the eight institutes named above offer the companies participating in DFAM the following special advantages:

Every participating company has the right to claim a free advisory session lasting one to two days a year at the institutes. Companies participating in the DFAM will receive a member discount of 25 percent on all events and courses offered at the institutes. This is balanced by a yearly contribution by the participating companies, currently 3000 German marks.

This amount is generally required as an industrial contribution for implementing the research projects, on the basis of which public funding of at least the same amount can be obtained for good projects from the AIF (Working Group of Industrial Research Associations). Every additional penny in participants' contributions can thus be at least doubled by public funding, and this creates a basis for further joint industrial research projects.

### Germany: Creation of Technology Council Postponed

95WSW0011A Munich SUEDEDEUTSCHE ZEITUNG in German 1 Oct 94 p 33

[Article: "Government Postpones Creation of Technology Council Under Federal Chancellor"; first paragraph is editor's summary]

[FBIS Translated Text] Bonn—The appointment of a high-level "Council for Research, Technology and Innovation" under the leadership of the Federal Chancellor, which had been announced at the end of February, has been postponed by the Federal government until the next legislative session. The reason given in Bonn was that the naming of its members, which was to have been completed by April, took so long that it was finally given up because the time for elections to the Bundestag was so near. According to the statement, another factor in the decision was that some candidates wanted to avoid the impression that they were preoccupied by politics so near to an election. Within the Federal government the Technology Council is still controversial (see "Themes of the Day").

The establishment of the board, which is to include high-powered representatives from science, business, unions and the Federal government, had been announced at the end of February in connection with the debate over Germany's standing. The subjects of discussion were to be topics concerning Germany's standing in research and innovation which transcended specialties and departments, such as the openness of society to research and new technological developments and cooperation between science, business and government.

A group of 20 representatives of different groups—including union chief Hermann Rappe, the presidents of the six major science and research organization and business representatives—met four times between November of 1993 and the end of April, 1994, at the invitation of the office of the Chancellor. But they did not name the members of the Technology Council.

It is understood from those who participated that the group was too big for the Chancellor's office. There was pressure for a reduction in size, and it was suggested that the six scientific and research organizations—the Vice-chancellors' Conference, Major Research, the Research Society, the Scientific Council, the Max Planck Society, the Fraunhofer Society—should name three representatives. But since the council was not finally constituted, this selection also did not take place. Nevertheless, as participants in the long round of conversations stress, the discussion brought results. For one thing, they said that the talent-securing program (Industrial Years for Young Scientists) and the "Research Days" had been agreed upon in these rounds. "We had a reasonable session which lasted too long for it to be possible to install the council," one participant said to SZ [SUEDEDEUTSCHE ZEITUNG].

Still, the establishment of a technology council sponsored by the Federal Chancellor is not uncontroversial. For example, representatives of basic research expressed a fear that the council could cause the interests of basic research to be subordinated to those of industry. The president of the German Research Society, Prof. Wolfgang Fruehwald, expressed reservations in principle. He did speak in support of a board under the Federal Chancellor, but said that its goal must not be to sacrifice Germany's decentralized and self-governed research system to planning games. He said that what was really needed was a "coalition of reason" to preserve freedom and develop mental possibilities for research.

Even within the Federal government the Federal Chancellor's Technology Council is controversial. In the Federal Ministry of the Economy, there is said to be "no enthusiasm" with an appeal to principles of political hierarchy. The Chancellor's Technology Council is regarded with mixed feelings right up to the highest levels of the Federal Research Ministry, although by now the ministry has set up an office for the new board. It is said that the expectations from the council cannot be met by it alone. People in the office of Minister Paul Krueger (CDU) also point to the "strategic circle" sponsored by the Federal Research Minister, which has existed for months, and which would discuss the same comprehensive topics (conditions, structural problems, research climate) as in the Technology Council.

The idea of a Technology Council is also being pursued in the SPD, although with a different objective. The Social Democrats do not want to assign it to the Chancellor's office, but are thinking of a nine-member board on the model of the council of experts which analyzes total economic development. Five members would come from science, two each from business and the unions.

#### **German Companies Use DESY Synchrotron for Research**

95WS0010A Duesseldorf *HANDELSBLATT* in German  
5 Oct 94 p 31

[Article by Lutz Bloos under the rubric "Research and Technology": "DESY/Cooperation With Industry Enabled. Industry Making Use of the Research Laboratory"; first paragraph is an introduction]

[FBIS Translated Text] Laboratories for basic research can also be used for applied industrial research. An initiative by researchers at DESY in Hamburg demonstrates this. They introduced their HASYLAB laboratory to representatives of industry at a conference and offered it for their experiments.

Tuesday, 4 Oct 94, *HANDELSBLATT*—Industry and basic research seldom have common interests because industrial companies, in contrast to basic researchers, are interested in results that can be used for practical purposes. But the German Electron Synchrotron (DESY), in which the smallest structures of matter are being studied, sent out

an invitation to an industrial conference for September. The researchers were very pleased: twenty-five companies sent around 75 participants.

For a year one of the best synchrotron radiation sources, with 39 measurement locations and 83 different instruments, has been available for eight months of the year for application-oriented research. This became possible because the aged DORIS [double storage ring] storage ring is no longer needed for particle research and can be used now for synchrotron radiation research.

#### **DORIS Storage Ring Available**

Synchrotron radiation is emitted by electrons on curved paths. It encompasses the entire spectrum from visible light to the hardest x-radiation, and, like laser radiation, is sharply focused and polarized. The polarization can especially be made use of in order to study magnetic phenomena.

X-radiation, that is a great deal stronger and more sharply focused than radiation from any other source, has indeed always stimulated the particular interest of materials researchers and microbiologists as well as criminologists and medical people. Two additional measurement locations will be set up in the coming year in the PETRA electron storage ring, which is being used as a pre-accelerator for the HERA. Even harder x-radiation is available here because the electron energy is approximately two and a half times as high in this storage ring as in the DORIS.

DESY now wants to give industry the opportunity to study questions that cannot be investigated in companies because they do not have the capacities for experimentation. In turn the researchers are hoping to be able to develop new apparatus for new experiments. How small industry's participation in research has been thus far is shown by the fact that in 1993, of 423 published studies only 19 were written together with scientists from industry. It is quite different abroad. In Japan and the U.S., industry is systematically making use for its own research of the available synchrotron radiation sources.

Thus far HASYLAB has not had the personnel to plan, prepare and attend to industrial experiments. Now a service group is to be established that will concern itself exclusively with companies and their experiments. The personnel costs are to be defrayed from industry's fees for radiation time.

The cooperation model presented during the conference provides for a three-year commitment by a company or an alliance of several small companies to pay an annual basic fee of 50,000 German marks [DM]. For this they are permitted 500 hours per year for making measurements with the equipment and will be supported by the service group. Besides, it can be arranged to wait with publication for up to three years. In addition, in the three-year test phase of the model, companies are to be completely excused from HASYLAB's publication rule. This is a generous accommodation to researchers, seeing

that without this offer there is little chance that industrial research would conduct measurements in the HASYLAB. For no one would be willing to provide his research results in-house gratis to the competition.

#### Service Group Helping Companies

Dr. Jochen R. Schneider, a professor and head of HASYLAB, is very pleased that two companies have already during the meeting signed contracts for a three-year cooperation arrangement. Two others are close to signing. Wacker-Chemie [Wacker Chemicals] of Munich, Germany's largest maker of silicon crystals for chip and solar cell manufacturing, made the quick decision. The capabilities available at HASYLAB make it possible to study crystal structures in such a way that one can also see individual atoms and their inclusion in the crystal lattice. Then, for its part, the information from the measurements makes it possible to design for a definite purpose the crystal structure and to dope it with impurity atoms. Then there can be new products at the end of a series of experiments.

The Haldor-Topsoe A/S company, in the small and medium-sized class, from Denmark is developing and producing catalysts for the cleaning of flue gases. It has at HASYLAB not only the opportunity to study new materials, but also to film, so to speak, the reactions that occur during catalysis. This is possible because the radiation is pulsed. Approximately one million flashes of light lasting one ten-billionth of a second fall per second on the material under study. So the synchrotron radiation can be used exceptionally well as a stroboscope and make it possible to see dynamic processes in a million snapshots per second. Here too the new information gained can be turned directly into innovative products.

The use of synchrotron radiation is of importance also in molecular biology, pharmacy and chemistry in the deciphering of complex compounds. In addition, in medical diagnosis the radiation source offers coronary angiography that is hardly a strain on the patient. The conventional method, in which a contrast medium is injected into the circulatory system, involves risks for the patient. The experiments are being performed together with Eppendorf University Hospital in Hamburg.

#### France: CNRS Head Interviewed

BR0211154194 Paris LE FIGARO in French 18 Oct 94  
p 14

[Interview with Guy Aubert, new director of French National Center for Scientific Research, by Jean-Luc Mothias; place and date not given: "CNRS In the Red Must Tighten its Belt"—First four paragraphs are LE FIGARO introduction]

[FBIS Translated Text]

#### Researcher and Leader of Men

Guy Aubert is 56 years old. In his career as a physicist specializing in magnets, it would appear that a bit of

their magnetism has rubbed off on him. This is a man who knows where he stands. His rugby-player silhouette is often seen at his office window as early as 6:30 in the morning. The new managing director of the French National Center for Scientific Research [CNRS] is brimming over with energy, but he manages to channel it into his 13- or 14-hour working day. His grandparents were farmers, his parents provincial school teachers, and he claims to have "plowed a republican furrow."

After having shone at elementary-school teacher training college he passed into the high-school teacher training college in Saint Cloud and graduated top of the class in physics. This gave him the opportunity—rare at the time—of entering the field of research at the CNRS. He recalls: "I was lucky enough to answer the call of Louis Neel, the famous Grenoble professor, who won the Nobel Prize for Physics in 1970 for his work in the field of magnetism."

Guy Aubert still remembers the example of his master and he considers he is honoring it by continuing with his research work, even in his current job. In 1965 he left the CNRS and joined the university of Grenoble, and by 1968 he was a professor and head of that institution's physics department. He was the general administrator during the student demonstrations and acquired a taste for debate and dialogue. He occupied a number of senior positions in the university, but refused to be elected president because "the pilot of an aircraft must never be elected by the passengers."

From 1980 to 1988, he presided over the French-German laboratory for intense magnetic fields (one of its members won the Nobel Prize in 1985), before founding the Lyons higher teacher training college. At the beginning of 1994, he was charged by the further education and research minister to write the synthesis report for the national consultation on research. Since then, Guy Aubert has taken firm hold of the CNRS reins and is indeed plowing a straight furrow.

[Mothias] What state was the CNRS in when you were appointed on 19 July?

[Aubert] In an excellent state, from the point of view of the quality of the people working there. They are almost all enthusiastic people with a great passion for research. This passion is shared by the 11,000 researchers and the 16,000 engineers, technicians and administrative staff.

On the other hand, the financial position was rather disappointing. The CNRS ended 1993 with major financial difficulties. There is currently a deficit of more than 400 million French francs [Fr]. It is hard to believe, but that is the way it is. Certain of the CNRS's suppliers were paid very late indeed. The effect is not only deplorable but this situation also created problems for several small companies. That is unacceptable.

However, the laboratories had not spent any more than they were told they could spend. The reasons for this

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situation go back to 1992, and have nothing to do with the CNRS. However, things took a turn for the worse when the general management of the CNRS did nothing to set things straight. It hid the problem by mobilizing other resources.

[Mothias] How could such a deficit have been created?

[Aubert] When the state adopts the nation's budget, it gives a certain amount of money to what the [passage illegible]. However, this is not "real money." The PA's are only translated into hard cash through the payment credits mechanism (PC's). It is the PC's that you can really spend. In the normal run of things, a PA naturally gives rise to PC's. This process may be off-set in time but, in a period of growth, nobody really notices. That was the case until 1991. In 1992 and 1993, however, the state did not pay all the PC's that corresponded to the PA's.

The problem was that, at the CNRS, the laboratory directors were managing their budgets on the basis of the PA's. The gap between the money promised and the money paid was Fr210 million in 1992, Fr220 million in 1993, and Fr120 million in 1994. That is why we had problems paying our bills.

[Mothias] One of the first things you did was cut the CNRS laboratory resources. Why did you do that?

[Aubert] I was like a car driver who had had his blindfold removed only to see a wall looming up in front of him. There was no other solution but to slam on the brakes. That is why I initially suspended all orders, to obtain a clear view of the situation. It was not easy, since—for quite justified reasons to do with flexible budget use—the CNRS management system made it hard to obtain an immediate overview of expenditure.

We were able to start spending again on 20 September after a full X-ray had been taken. Because of the real state of the coffers, I was only able to reauthorize 60 percent of the expenditure in PA terms. The other 40 percent is still pending. So there has been no "suppression" of 40 percent of our resources, as I have heard people say, and, what is more, the guillotine will not fall without the chance to lodge an appeal, since we are trying, wherever possible, to find solutions for those laboratory directors who would have major difficulties in light of their commitments.

[Mothias] The research minister asked you, at the beginning of the year, before you were appointed to the CNRS, to write the synthesis report for the national consultation process. What image did you have of the CNRS at that time?

[Aubert] The CNRS came out well in the report and its integrity was further strengthened. It is correctly seen as being the pillar of basic research in France. The consultation process was also an opportunity for everyone to voice their ideas. The CNRS is again on a stable footing, but it must continue to evolve.

[Mothias] It is said that you are prepared to alter the system of CNRS laboratory financing—the annual budget—to more closely resemble the American system.

[Aubert] We must certainly not import a model from one place, even supposing that one exists, to another where the specific conditions are quite different.

A number of paths are being examined for the CNRS to follow. There is an ongoing process of debate and consultation. It is possible that the way in which laboratories are granted their resources could be changed. I would therefore like there to be, in addition to a large, fixed grant for the laboratories, another, not-insignificant sum based on program development.

[Mothias] What general directions have you laid down in your plans for the CNRS?

[Aubert] The CNRS must fight firmly established things that are preventing it from evolving and changing to meet fresh requirements. Much thought needs to go on the question of funding. A second consideration is how we can strengthen partnerships between the CNRS and the economic and industrial world, other research bodies, foreign centers, and, above all, how we can work with the universities.

A document will soon be presented on this topic at the next plenary session of the conference of university presidents. We will also have to look at the issue of research planning. The CNRS needs many open programs from both the traditional program planners from the top of the tree and, above all, from the main body of researchers.

[Mothias] What job have you given Jean Charvolin?

[Aubert] Jean Charvolin is an eminent and well-known physicist. He is the director of the Laue Langevin Institute in Grenoble. I have asked him to draw up a report on all the changes that have to be made to the organization of CNRS research. It is not a question of shake-ups but a continual process of adaptation and change.

[Mothias] What is your schedule?

[Aubert] This reorganization will begin in just a few weeks or months. A number of proposals will be presented at the next CNRS board meeting on 27 October.

### Italian Research To Be Reorganized

MI2610142594 Milan IL CORRIERE DELLA SERA—CORRIERE SCIENZA Insert in Italian 16 Oct 94 p 35

[Interview with Prof. Stefano Podesta, Minister of University and Scientific Research, by Giovanni Caprara in Rome; date not given: "An Interview with Minister Stefano Podesta Who Intends To Drastically Reorganize the National Sanctuaries of Science and Establish Priorities. Scientific Research: The Whole Thing Must Be Done Again. Cuts in the CNR, the ENEA and Space. Funding for Physics, Applications, and Universities;"]

first two paragraphs are Giovanni Caprara's introduction; last five subsections are by Giovanni Caprara and are related]

[FBIS Translated Text] *At the Ministry of University and Scientific Research they are preparing a seaquake. Organizations and scientists could soon be swept over by a wave that will have incalculable effects. The unexpected shock wave that shook the ENEA [National Agency for New Technologies, Energy and the Environment] two weeks ago (it was suggested that it should be closed) was only a warning tremor.*

*Stefano Podesta, the minister, in his bureaucratic-style building overlooking the Tiber, looks indifferently and a little indignantly at the little sea of Italian research where old galleon organizations, that have suffered because of too many boardings, are floating.*

[Podesta] It is useless to think about increasing funds here; firstly because there are not any, and secondly because a general reorganization is needed to begin with. It would be enough to make better use of the resources that are available; streamlining the bureaucracy would already be an improvement.

Italian research may produce good results, but there is nobody who checks, or who circulates the results obtained. So scientists do not spur each other on, and people, not having any information, think that the money is being thrown away. In addition, researchers should be allowed to patent their successes and earn something from them.

[Caprara] Your predecessor, Colombo, had written a three-year plan to increase the 22 trillion lire that are spent today. This figure corresponds to 1.3 percent of the gross national product, which is well below the European average of 2 percent.

[Podesta] Ministers can make all the plans they want to, and divulge them to public opinion. In this way they save their image and their soul. However, it is not serious to propose an increase in expenditure when this is not possible. I prefer to strike out toward more limited goals. When I obtain the funding I will explain why I asked for it, what the goals are, and how I intend to use it. Among other things, both the universities and research have already managed to obtain more funds than they had last year, and this is the first time that this has happened in the last five years.

[Caprara] What is behind the ENEA shake-up?

[Podesta] I was dealing with Gnutti, the industry minister, to take the ENEA under the control of our ministry. The ENEA has been dragging itself along in a sea of problems since it stopped dealing with nuclear power. When tackling the figures in the finance bill it was decided to make a cut in its budget and somebody took the opportunity to suggest that it should be put into liquidation. However, before proceeding to that sort of intervention, given that it is an organization that has a

precious patrimony of researchers that should not be lost in a country that has a lack of scientists, I proposed a reorganization of the entire national research world, creating an organic pole that avoids duplication and bureaucratic giantism.

[Caprara] Many poles have been proposed in Italy in the last 20 years. What will we find in the research pole?

[Podesta] It is true, the word is abused, but in this case it means the reorganization of research under a single management, destroying the existing situations but safeguarding the resources, the competencies, and the know-how that have been accumulated. However one single research organization will not be created because it would be gigantic and indigestible. I am thinking about merging the small organizations that are similar to each other, and then of having a number of medium to large organizations like the INFN [National Institute for Nuclear Physics], that are well finalized and all come under the aegis of the completely reviewed and revised CNR [National Research Council]."

[Caprara] And when will you move from theory to practice?

[Podesta] Now I am going to listen to the various presidents of the organizations, and then I am going to set up a commission that will quickly present me with its proposals. I will collaborate with other ministries because we should avoid a situation in which each administration conducts its own research, unless we are dealing with small very specialized nuclei. I am not aiming to make a conquest, but what else can we do? An inventory has not been drawn up yet, but political forces agree on the goal of rationalization. I will present a plan within 30 days.

[Caprara] However there are some organizations that are somewhat atypical and do not carry out research, but only manage the distribution of research funding, such as, for example, the Italian Space Agency...

[Podesta] The intermediary funding organizations could disappear; they remind me of a circus caravan. Their function could be carried out by committees of the CNR or the ministry. Therefore if the ASI [Italian Space Agency] intends to continue along this road, there is no reason for it to exist. Among other things it is one of the agencies that there is most gossip about and it needs to be dealt with using a heavy hand. In the meantime, I have already set up an investigating committee. However, international commitments will be maintained. To be clear, I am not in favor of probes that go to explore Mars, but on the other hand I view satellites for telecommunications and computer links, and all the developing sectors that have major spin-offs affecting industry and communications processes, with interest.

[Caprara] Priorities have never been established in our country; there has always been something for everybody. And now?

[Podesta] The areas in which investments are to be made are those of electronics, biotechnologies, new materials, non-polluting energy, and the automobile because it is a connecting point between electronics and materials. Also for this I am creating a committee that will produce a plan of the priorities that more investment will go to. Enough of many small goals. The scientific community must be willing to make choices. Some people will be discontented, but that will be unavoidable. Anyway the plan for the priorities will proceed independently of that for the restructuring.

[Caprara] In Japan private research constitutes 80 percent of the total expenditure. It accounts for about 50 percent in Italy. Renato Ugo, president of the industrial research association, says that we do very little private research and that it is done badly. Is this true?

[Podesta] Ugo is right. There is a reciprocal diffidence between the public and the private sectors. They do not communicate. Companies expect funding for research to come from the state, and the public centers want to be free of any goals, and they do not feel that they are responsible to the country. It will be an enormous task; here we need to change our mentality.

[Caprara] On the subject of targeted research, Italy has always spent money on particle physics research in the past without problems. This produces knowledge but little help for the development of the country which on the other hand could come from solid state physics or the biotechnologies. Will this continue?

[Podesta] Our nuclear physics tradition goes back to Fermi, and our scientists gain us world honors. They are the flower in our buttonhole, why humiliate them?

#### **The CNR: An Organization That Is Too Expensive and Needs Restructuring**

The CNR is the flagship of Italian research. It employs 6,535 people, and in the 1995 finance bill the research minister planned for its proposed budget of 1,040 billion to be cut by 40 billion. The CNR deals with everything. Its structure could have been good in the times of Marconi but it certainly is not adequate for today's requirements. It has been criticized for years because it absorbs a rain of funding, its management continues undauntedly favoring the interests of internal groups, and not those of science and of the country.

#### **The ENEA Has Been in a Never Ending Crisis since Nuclear Power**

The ENEA, controlled by the Ministry of Industry, is the second Italian research organization with respect to the number of employees; there are in fact 4,500. This year's budget is 726 billion lire, but cuts of 100 billion lire have

been proposed for next year. After abandoning nuclear power (at that time it was called the CNEN [National Committee for Nuclear Energy]), the ENEA extended its interests, too, moving out in many directions, perhaps too many, and losing identity. The environmental activity that is now passing to the Ministry of Environment had become an important part, but it also dealt with robotics, computers, energy, Antarctica, and nuclear fusion.

#### **The INFN: A Physics Institute To Be Imitated**

The INFN [National Nuclear Physics Institute] has been pointed to more than once in recent years as a model of good functioning tied to good results. It has branches in various regions and employs a total of 1,630 people. The planned budget for 1995 was 400 billion, but the minister has proposed an increase of 70 billion.

Today it seems to be the safest institution in the Italian panorama of research organizations as far as eventual changes are concerned. Its scope is pure research, but lately, noting the signs of the time, it has not disdained the exploration of eventual practical spin-offs.

#### **The INFN Has Just Been Set Up To Study Materials**

The INFN [National Materials Physics Institute] is the last of the research organizations to have been established, gathering together the initiatives of a former inter-university consortium. It appeared on the scene last year and involves 2,350 people in various ways. Its world of research is extremely applied. For example, it studies new materials like superconductors, and it investigates the structure of materials for applications. For this reason men from INFN work on the "synchrotron light machines" at Grenoble and Trieste. The budget for the current year is 75 billion lire and for next year it should be the same.

#### **ASI: A Sea of Space Problems and an Uncertain Future**

ASI, the Italian Space Agency, was established in 1988, in a transformation of the old national space plan managed by the CNR. Internal disagreements, and the controversies in which it has been involved during the last three years, have made it the most discussed organization, and that with the most uncertain future. The ASI has lost a good opportunity for a series of space activities to be launched and now it will be very hard for the new administration, that has just been formed, to get back up the slope again. It only has 90 employees, and there was a planned budget of 900 billion lire for 1995; but the minister Podesta, who appointed a committee to investigate the organization a few days ago, has cut this by 50 billion. The ASI manages the funds that go to industry and to researchers.

**Romania, Moldova S&T Cooperation Reported**

95P60009A Bucharest *STIINTA SI TECHNICA*  
in Romanian Sep 94 p 7

[Article by Cristian Roman: "What About Romanian Research?"]

[FBIS Translated Text] It's common knowledge that our country is going through difficult times. Much less is known about the fact that, during this extended crisis period, research activity for the technologies of tomorrow did not cease. On 25 July 1994, during a press conference, the Ministry for Research and Technology reported on its preoccupations with respect to [Romania's] research activity restructuring, the results of Romania's cooperation with the Moldovan state beyond the Prut River, as well as on the spectacular science accomplishments obtained by the Romanian polar

research team under the leadership of Teodor Negoita (on this subject of up-until-now unexplored polar regions we have prepared material to be published in an upcoming issue).

For the time being, we will mention only some aspects of the Romanian-Moldovan research cooperation. This common program is extremely ambitious, when considering the large variety of top technologies approached. We will mention just a few: development of high-temperature superconducting materials, semiconductor and solid environment laser systems, development and encapsulation of lithium-based batteries, automated electrostatic-field liquid painting systems, composite materials with applications in tribology, electronic medical equipment, etc. Although the program was launched as recently as the second half of 1993, some results can already be reported. But about them in a future issue.

### **Italy: Alenia Spazio Merges into Marconi Communications**

*MI2410142594 Rome SPAZIO INFORMAZIONI in Italian 16-30 Sep 94 pp 6-7*

[FBIS Translated Text] An agreement was signed at the end of last July to incorporate a new company, MAC Alenia-Marconi Communications, with the joint participation of Finmeccanica and Marconi to be led by Sandro Gualano as president and Carlo Scaglia as managing director. Carlo Lastrucci, Roberto Faggi, Remo Pertica, Giovanni Vinelli, Andrea Pucci, and Aldo Olivari are on MAC's board of directors. The new company will operate in the world market for mobile telephones, ground-air-sea radio-communications systems, telematic systems, traffic control systems, and access systems.

Marconi's telematic systems division, and part of its public telecommunications, military telecommunications, and avionic systems divisions, as well as the controlled companies Larimart and Prodel, will join MAC. OTE, Elmer, and Alenia's information science and telecommunications division, and Alenia Spazio's ground station division will join MAC from the Alenia/Finmeccanica side. The total value of its assets has been evaluated at 540 billion lire, including the 300 billion in financial debts that have also been transferred to the new company. In order to have equal shares in the patrimony, Marconi will make a contribution of 100 billion lire to increase the capital; to the same will be recognized the value of the contribution of Larimart and Prodel.

With more than 2,000 people, and a turnover in excess of 500 billion lire, and with results on an economic plan showing a profit from the first year of its activity, MAC will work from its main centers of activity in Rome, Florence, Genoa, Pomezia (Rome), and Catania, having its own offices abroad, and the benefit of the places of business belonging to Finmeccanica and GEC-Marconi worldwide.

### **The Activities of MAC**

MAC's "private systems" activities in the radio-communications sector will be directed to the construction of mobile radio-communications systems for private users; particularly analogical and digital PMR [private mobile radio] systems, satellite systems, V-Sat networks for the distribution of data, and commercial and "customized" stations. The new company will produce mobile terminals and network infrastructures for the public cellular radio-communications market, with

particular reference to the new GSM/DCS 1800 systems. Furthermore, it will build satellite equipment for ground operation, mainly relating to the stations destined to public telecommunications networks (standard stations for international organizations, such as INTELSAT and INMARSAT) and V-Sat networks. MAC's products in the tactical and strategic communications systems sector, will be essentially ground, air, and naval military radio communications systems (HF [high frequency], VHF [very high frequency], UHF [ultra high frequency] frequencies), and satellite terminals, as well as systems for radio navigation, radio location, and ciphering for military use. All the systems dedicated to control, to location, and to communications with moving vehicles, including air-ground-air communications systems for air traffic, radio location and fleet management systems, come into the mobility management product line.

MAC will manufacture systems to supervise and control public and private communications networks, oriented toward new services, as well as terminals and network servers, telesurveying systems, and systems for access control, videotel and videotext for the telecommunications and special information science sectors.

### **Alenia Spazio's Ground Station Division**

Alenia Spazio's ground station division will also join MAC. At present it is directed by Eng. Antonino Simone, and is engaged in a series of important technological and commercial programs. As far as this division is concerned, Alenia Spazio's report for last year states in fact that: "Important supply programs were completed during the 1993 fiscal year, such as the second lot of preoperative stations for Italsat, the second and the third TLR stations for the Helios program, two experimental stations for broadcasting at very high frequencies (40-50 gigahertz) for Italsat, as well as two stations that have been delivered for Ecuador. The supply of the terminal for the master testing station of the OBP [on-board computer with microprocessor] program was also completed. The activity of commercialization of INTELSAT [International Telecommunications Satellite] and EUTELSAT [European Telecommunications Satellite] stations, as well as the SESNET system, that has a new conception, and is destined to networks with a low traffic density, has continued on the international markets. Finally,—concludes the report—the supply contract for 860 stations for the Iranian telecommunications company has not come into effect, following the non-activation of the financing line by Mediocredito Centrale, that is awaiting the necessary insurance cover from the SACE [Export Credit Assurance]."

**Netherlands: DASA Confirms Plan To Fund Fokker**  
BR2410162194 Paris AIR & COSMOS/AVIATION  
INTERNATIONAL in French 30 Sep 94 p 15

[Unattributed report: "Fokker Awaits Capital—No Date Has Been Fixed Yet for the Company's Recapitalization"]

[FBIS Translated Text] In an interesting historical twist, the American Ford Motor Company, which was for a long time involved with Fokker before World War II, will take delivery at the end of October of the first production Fokker 70. Announced on 28 September in Amsterdam at the ceremony to mark the 75th anniversary of the Dutch aircraft manufacturer, the arrival of the Fokker 70 on the market next month has rather overshadowed the financial dealings related to the company's future as part of the DASA [German Aerospace] group.

Representatives of the German group have just confirmed the terms of the agreement concluded in July for the recapitalization of Fokker. DASA is continuing its talks with the Dutch Government to dot the i's and cross the t's for the operation in which German Aerospace will be investing some 600 million guilders. No timetable has been set, however, for this financial package which is worth a total of 3 billion French francs [Fr]. Announcing a deficit of Fr1.5 billion for 1993, Fokker predicts it should be able to get back into the black by 1996.

The arrival of the Fokker 70 is another reason to be confident about the recovery of the company. The first Fokker 70 (an "executive" version) will be delivered on 25 October to Ford, and a second aircraft will be delivered to Sempati in February 1995. The third production aircraft will be delivered in March to Mesa Airlines of the United States.

Fokker, which has invested 500 million guilders in this program, says it is satisfied with the performances recorded in tests (already 440 of 480 test hours have been completed). Consumption is 2.5 percent less than predicted while range exceeds 160 Nm (300 km).

The Fokker 70 should receive FAA certification on 14 October. The Schiphol-based manufacturer has 33 firm orders and 12 options for the Fokker 70 at a cost of \$24 million per aircraft. An initial production rate of 16 to 17 planes a year is predicted for a total production of 45 aircraft of all types in 1995.

In addition, Fokker has consolidated its position as the leading producer of regional jet aircraft, with 62 percent of all sales in the 50-seater niche over the past three years, thanks to the Fokker 50.

**Germany: Optimistic DASA 20-Year Outlook on World Market**

BR1910163594 Paris AIR & COSMOS/AVIATION  
INTERNATIONAL in French 30 Sep 94 pp 12-13

[Article by Jean-Pierre Casamayou: "A \$900-billion Market for Airliners Between Now and 2013—A Study

by German Aerospace Forecasts 16,730 Airliners Ordered, Including 5,430 Commuter Planes"]

[FBIS Translated Text] Commercial aircraft manufacturers remain optimistic in the long term. Following Boeing's forecast of a market of 14,054 airplanes of 70-plus seat capacity between now and 2013, German Aerospace [DASA] has just presented the results of an equally optimistic study, albeit slightly more modest than that of Boeing. The German manufacturer is convinced that over the next twenty years the airlines will order 11,300 airliners with over 70 seats, and 5,430 airliners with fewer than 70 seats. Total orders should approach \$900 billion, or an average \$45 billion or around 250 billion French francs per year. "The present stagnation in the market will not last much longer," states Hartmut Mehdorn, head of DASA's civilian aircraft sector. "Our forecasts clearly indicate that the potential market for airliners is growing strongly." "But the European industry will not be able to maintain its place in the international market, unless its environment becomes comparable with that of its American rivals."

DASA's study is based on an analysis of the requirements of over 500 airliners. At the end of 1993, they owned a fleet of 13,392 aircraft, consisting of 4,392 regional airliners, 6,506 airplanes with 70-210 capacity, and 2,394 airplanes with over 211 capacity. Another factor is the average age of this fleet, with the consequent replacements, together with the prospects for growth in air traffic. These are estimated at 5.5 percent per year for regional traffic, and 4.7 percent for international traffic. The greatest growth will be in the Asia/Pacific region, likely to show growth rates of 7.7 and 6.3 percent, respectively, in both categories.

Though these figures are lower than those for the previous period (8.9 and 6.5 percent growth, respectively), total traffic should reach 246 billion passenger-kilometers for regional aircraft, and 5,300 billion passenger-kilometers for other airliners, by 2013. In addition, the German analysts estimate that occupation rates will rise from 53 to 58 percent, and from 65 to 75 percent, respectively. They also estimate that the average number of seats per airliner will rise from 33 to 36 for commuter planes, and from 182 to 236 for other aircraft with capacity over 70 seats.

On the basis of these hypotheses, DASA estimates a potential market (excluding the CIS) of 16,730 aircraft.

This is divided between 5,430 regional aircraft (2,650 to ensure growth, and 2,780 to replace aircraft withdrawn from service), and 11,300 aircraft with over 70 capacity: 5,310 to replace old planes, and 5,990 to meet the growth in traffic. A more detailed analysis shows that in the commuter category, the 15-20 seat sector will be almost entirely a replacement market, as will that of the 70-170 seat sector, in the larger category.

Still in this category of airliners, it can be observed that the single-aisle sector (between 70 and 210 seats) shows

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the greatest potential for aircraft numbers, with an estimated 58 percent of the market. However, it can also be observed that twin-aisle planes (with over 211 seats) will account for 65 percent of total purchases, estimated at \$897 billion. It should be noted that this analysis assumes a market of 700 aircraft, estimated at \$133 billion, for super-jumbos with 500-700 capacity.

Deliveries of these 16,730 aircraft will take place at an annual rate of 270 for regional airliners, and 565 for other aircraft. Deliveries of the first category will show a slight dip in the 2000/2002 period, falling below the threshold of 200 per year, before climbing back above 400 per year by the end of this period. DASA's study shows deliveries in the second category reaching almost 650 units in 1997 and 1998, then falling back toward 500 units between 2003 and 2007, before rising slightly to stabilize below 600 aircraft per year.

Despite the expected growth in the commuter market, it is obvious that there will not be room for everyone. At present, 10 manufacturers are offering 27 different aircraft in this category. "Overcapacity, combined with the price war, makes a reduction in the number of competing players, particularly through mergers, inevitable," states DASA's report. This is exacerbated by the fact that growth in rapid train transport may reduce the demand for regional aircraft by around 7 percent. In the larger category, on the other hand, "Airbus Industries, Boeing, and McDonnell Douglas will continue to share the market, developing new aircraft in the 90-130 seat and 500-700 seat category."

Finally, the study does not place too much emphasis on the CIS market, "owing to the great uncertainty in these countries' economic and political futures." Nevertheless, it does anticipate the possibility of a recovery in traffic from 1996, likely to show itself in the commissioning of 1,500 new aircraft, 30 percent of which will be twin-aisle airliners. Western aircraft are likely to account for 20 percent of this market, though mainly in the form of second-hand or rented planes.

#### **Germany: Siemens to Consolidate Research Activities**

95WS0012C Munich ELEKTRONIK in German  
20 Sep 94 p 8

[Article: "Faster, Leaner and More Strongly Global"]

[FBIS Translated Text] Siemens will combine its research activities, previously divided into the two main divisions of basic technologies and systems technologies, into the Central Division for Research and Development (ZFE). This is being converted into a more strongly project-oriented organization, with simultaneous elimination of hierarchies, under the direction of Prof. Claus Weyrich. Siemens is hoping that this reorganization will bring quicker adaptation to new market conditions and an accelerated assimilation of innovations in the operational units.

Research and development activities will have a more strongly global orientation in the future. The future coordination of these tasks will be the province of Prof. Hans Guenter Danielmeyer, member of the board of directors of Siemens AG, Berlin and Munich.

Siemens maintains research and development laboratories in more than 25 countries, and cooperates with universities and other research institutes worldwide. About 10 percent of sales are spent annually on research and development; in 1992-93 this amounted to almost 8 billion German marks.

#### **Germany: Hoechst Executive on Research Activities, Genetic Engineering**

95WS0023A Stuttgart BILD DER WISSENSCHAFT  
in German Oct 94 pp 114-115

[Interview with Utz-Hellmuth Felcht, board member of Hoechst AG, by Wolfgang Hess; place and date not given: "End of Subservience"; Subheads: "Hoechst Inc. [AG] Intends to Recoup Lost Ground Using New Research Structure"; "Board Member Felcht Builds on Project Teams"; "He Intends to Intensify Research Activities Abroad and Expand Gene Technology"]

[FBIS Translated Text]

[Hess] Professor Felcht, Hoechst's pharmaceuticals research has lost its sheen. Formerly, your company held the number one spot internationally; at present, it is in the middle of the pack.

[Felcht] Now it is not that bad either. To be sure we have lost some stature. But we still continue to rank fifth or sixth internationally. After refocusing the thrusts of our research we have a number of nifty items up our sleeve, but given the long development times in pharmaceutical research it will still take them some time to reach the market.

[Hess] Will they help you recoup first place among pharmaceutical firms?

[Felcht] We want to figure among the major three. The pharmaceuticals market around the world is undergoing radical change on a massive scale...

[Hess] ... and the bottom feeders, the so-called generics manufacturers, are a major headache for Hoechst. In that context, you have now purchased the majority shares of Copley, a producer of generics in the U.S.

[Felcht] That is correct. And for many years now we have been involved with the Cox company in England that also manufactures generics. Considering the cost attenuation in the health industry, no pharmaceutical firm engaging in research can get by without also offering generics. What we are vehemently on guard against are mere producers of generics who do not spend a cent on research.

[Hess] Speaking of research outlays: in 1981 your firm signed a sensational contract with Howard Goodman, a genetics researcher in Boston. In exchange for \$100 million he was supposed to train Hoechst in gene technology. What became of that project?

[Felcht] The goal of that project was not, for example, gene technology products, as is so often asserted. Rather, we wanted to become familiar with and be trained in the genetics technology methodology of the world's leading institute. That was not possible in Germany. Since the virtually all of the top researchers in genetic technology have been trained there and they have picked up on many laboratory methodologies. As a result, in some areas of activity we have even been awarded basic patents.

[Hess] Is that not a rather slim payback on a \$100-million deal?

[Felcht] Without it we would presently be still limping along five years behind researchers on the cutting edge.

[Hess] So you are saying that your gene researchers are now on the leading edge, internationally?

[Felcht] Affirmative.

[Hess] So, what will you do with all those fabulously trained experts, considering the crisis in our country in terms of accepting genetic technology?

[Felcht] It is our hope, of course, that the situation in Germany will improve, including as a result of the newly revised version of genetics legislation. Unlike other companies, we have, in fact, never consciously deviated from that.

As I see it, the risk looms from another angle. For instance, once it was possible, in terms of genetic technology, for Hirudin, a blood-clot stanching agent, to be produced, we wanted to make use of a pilot plant in Germany. But it took more than two years for the process to be approved. Our French subsidiary, Roussel Uclaf, got approval for a large production facility after just six weeks. Plainly stated, that means: if a firm does not want to just toss away its competitive edge, based on such an experience, in the future it will seek approval for a plant wherever the reaction is speedier.

[Hess] Hoechst has now greatly expanded its research activities abroad.

[Felcht] In fact only a bare 60 percent of Hoechst's research is now being done in Germany. Since 1988 we have had a tri-regional research concept, with France and the U.S. as the foci outside of Germany.

[Hess] Will this trend continue?

[Felcht] I think that by the end of the century we will have a 50-50 ratio. One reason is that Germany is no longer the pacesetter for many technologies. For example, any chemical firm eager to be a principal

supplier for future consumer electronics will have to have research capabilities available in Japan.

[Hess] Whining goes with the territory in the business world and the chemical industry is especially expert at that.

[Felcht] I am not whining. I am pointing out weaknesses in Germany as a place to do business. From a global perspective, our firm still has alternatives. Although we are a German company, our competition is international. It makes no difference for the success of the firm whether we compete from Tarragona, Vlissingen or Frankfurt as places for doing business.

[Hess] Early this year Hoechst reengineered the organization of its research. Why?

[Felcht] We reengineered only our central research. General research had been reengineered back in 1989 in connection with the introduction of business units. The reengineering of the central research delegated greater responsibility to the project managers. Secondly, we want to create flexible, interdisciplinary teams as a result of it.

[Hess] That sounds nice but what lurks beneath it?

[Felcht] Formerly, for example, there was a "main laboratory" division that was responsible for the chemistry of synthetics. Or there was an "applied physics" division responsible for all physics problems. We have done away with such top-heavy divisions. Central research now consists of three project divisions having distinct objectives, one service division and a fifth division that works in very close proximity to the market.

The managers in those sectors are members of the so-called management committee. With such a hierarchical level there is neither a division manager nor a group manager—we have done away with all those functions—instead there are still only project teams and project managers.

[Hess] What is your aim?

[Felcht] The project managers are ad hoc appointees and therefore have to contend much more vigorously with the arguments of their colleagues than was the case in a strictly hierarchical structure. This inspires research.

[Hess] What rights do the project managers enjoy?

[Felcht] Each one has total disciplinary jurisdiction and his own budget. Once or twice a year the projects are submitted to the management committee, at which time joint approval is given to proceed further.

[Hess] Do the project managers act like managing directors for their projects?

[Felcht] They do, and that, of course, entails timely notification if they notice that things are not going right.

[Hess] Do the researchers readily agree to that?

[Felcht] We have already had some project managers state: it no longer makes sense to pursue my project. There has been greater courage to face up to reality. Formerly, such a thing happened very rarely, since a project manager was a job holder with no rights and frequently was unable to prevail against the division management.

[Hess] The operative words are: "Courage to face up to reality." What has your firm learned from the succession of incidents, mishaps and breakdowns of past years?

[Felcht] Better and even speedier communication following such occurrences that, unfortunately, cannot be entirely avoided. Also: continuous dialogue with the citizenry in the vicinity and the respective authorities and even more intensive training of employees. Briefly put: total quality management in production, communication, environmental protection and job safety.

**[Boxed item]**

Since 1991 Utz-Hellmuth Felcht has been on the board of Hoechst AG, in charge of research. As of the start of this year, the Ph.D. in chemistry (class of 1947) and professor at the university of Frankfurt has also been the labor director for his firm. Hoechst AG is part of the worldwide Hoechst enterprise that had a turnover of 46 billion German marks in 1993.

**France: Thomson-CSF To Enter Automobile Sector**

BR2810141394 Paris AIR & COSMOS/AVIATION  
INTERNATIONAL in French 7 Oct 94 p 13

[Unattributed report:]

[FBIS Translated Text] With the World Motor Show opening its doors again, first-time participant Thomson-CSF recently revealed that it would like to move into the car sector. Noel Clavelloux, director of the aerospace division, claimed that Thomson-CSF could record sales of around 500 million French francs [Fr] in this sector by 1998 (with anti-theft devices, car alarms, speed limiters, navigation systems, etc.). Note that its Auxilec subsidiary is working on electric cars, while SGS-Thomson currently supplies some Fr1.5 billion-worth of electrical components to car outfitters.

**France: Dufour To Replace Renon as SNECMA Chief**

BR2810132894 Paris AIR & COSMOS/AVIATION  
INTERNATIONAL in French 7 Oct 94 p 11

[Jean-Pierre Casamayou report: "Bernard Dufour New CEO of SNECMA"]

[FBIS Translated Text] It will have taken more than a month of tough negotiations to catch the "rare bird" that is the new CEO for the National Aero-Engine Research and Construction Company [SNECMA], following the death after a long illness of Gerald Renon on 7 September. The man finally chosen was Bernard Dufour, who has been CEO of GEC Alsthom Electromecanique since 1992.

Even though the appointment of Bernard Dufour may come as something of a surprise, since he was never considered to be in the running, nobody could say he was given a "leg-up" into the SNECMA top spot. At 61 years of age and a graduate of the prestigious Ecole Polytechnique, he has the ideal profile for the job. He knows all about aeronautics and engines, and has an excellent track record in industry. An Alsthom man for the last 17 years, he made his way up through the ranks. From director of the Belfort plant specializing in the production of steam and gas-driven turbines, he moved up to managing director of the Electromechanical division, later to be appointed CEO of GEC Alsthom Electromecanique. He succeeded in making his company (with 14,800 employees and generating turnover of more than 11 billion French francs) one of the world leaders in the industrial turbines sector. The SNECMA environment will not be too foreign to the new CEO, however. Strong technical synergies exist between the "air" engine manufacturer and the "industrial" engine manufacturer, as can be seen by the parts (turbine blades) produced by GEC Alsthom for the CFM56 program. However, above all, for this graduate of the California Institute of Technology who spent 20 years with Sud Aviation (later to become Aerospatiale), this will be his great return to the aeronautical world. Having joined Sud Aviation in 1957 as a production engineer on the Alouette, he was then appointed shop manager for the final assembly line of the first Caravelles in Toulouse, before being sent to head the T-38 purchasing mission in Los Angeles. He was then technical deputy chief of the Marignane plant, director of the St. Nazaire factory, director of the Toulouse plant from 1965 to 1976, and was then made deputy managing director of the National Industrial Aerospace Company [SNIAS].

In his new job, this skiing and horse riding fan will have to continue along the same lines of action as his predecessor to improve company management and make SNECMA profitable again. Maybe, too, he can bring SNECMA and GEC closer together, as Gerald Renon had wanted, to give the French engine manufacturer the same financial strength as its international partners and competitors.

**Italy: Alenia Aeronautica Official Discusses Company's Activities**

BR0411125794 Paris AIR & COSMOS/AVIATION  
INTERNATIONAL in French 14 Oct 94 pp 12-13

[Interview with Nino D'Angelo, CEO of Alenia Aeronautica, by Jean de Galard; place and date not given: "We Seek Establishment in Italy of a Final Assembly Line for the Future Large Aircraft"]

[FBIS Translated Text]

[de Galard] What is Alenia Aeronautica today, and how does it function?

[D'Angelo] One of the consequences for Alenia of the decision to reorganize the Italian aeronautical manufacturing sector has been an internal restructuring process,

with a dual aim: reduced costs and the ability to react faster. Since last March, Alenia Aeronautica, of which I am CEO, covers the activities of three organizational units: military aviation, civil aviation, and air structures [aerostructures]. These units have three operational functions: engineering, operations, and supply. All personnel matters have been split into four branches: Commercial, Quality, Administration and Control, Data Systems and Computerization.

[de Galard] You did say military aviation and not fighter aircraft, as was the case in an earlier structure?

[D'Angelo] Absolutely. The "Military Aviation" unit is now just as concerned with the future Eurofighter, the AMX and the Tornado as with the G222 or the future European tactical transport aircraft.

[de Galard] Can you quickly bring us up to date on the progress of each of these programs?

[D'Angelo] The Eurofighter program is well under way, even though the aircraft was unable to take part in the flight demonstrations at the last Farnborough Air Show, and from now on the production timetable for the initial prototypes is being kept to. The first flight of the number three prototype, the one which is currently being assembled in Turin under the responsibility of Alenia Aeronautica, is scheduled for March 1995. With its two EJ200 turbojets, its new flight control systems, and its fire control system, this will be the first really representative version of the mass-produced aircraft, and it is probably this number three which will be chosen for presentation in flight at the forthcoming Le Bourget Air Show, but as yet this is only a probability. As for the future of the program as a whole, we will have to wait for the outcome of the upcoming German elections. Italian requirements have been reduced to 130 machines. The Tornado production process is over but we must already think about modernization measures, while continuing revision activities. As for the version of the AMX intended for the Aeronautica Militare Italiana, 77 of the 136 aircraft ordered have been delivered. The Brazilian Air Force has ordered 56 and received 28.

The G222 is still able, long after its maiden flight, to arouse interest and attract orders. Let me remind you that the U.S. Air Force has become a customer (the American version has the designation C-27A), as well as, more recently, the Royal Thai Air Force which has ordered six aircraft, with delivery of the last one scheduled for the end of 1995.

Finally, we are looking at our participation in the program called FLA, Future Large Aircraft.

[de Galard] In this regard, is the setting up in Italy of a final assembly line a *gsine qua non* for your participation?

[D'Angelo] Alenia was one of the founding members of Euroflag and its resolute participation in the program could not be doubted. We are greatly in favor of the setting up in Italy of the final assembly line, because we

think that the experience acquired over the last few years with the construction and assembly of the G222 military transport aircraft justifies our assertion that we can manage all of the industrial aspects of such an operation. However, this is obviously not a prerequisite for our participation in the program.

At the last Farnborough Air Show the four partners in Airbus Industrie offered Alenia the opportunity to take part in building the FLA through a military division of Airbus. Alenia is examining this proposal in great detail.

[de Galard] In the field of "commuters," what do you think of the ATR-42/500 and the ATR-82?

[D'Angelo] First a general comment. Our union with Aerospatiale in the ATR [Air-Turbo Ramjet] EIG [European Interest Grouping] is truly a great success. It must be said that it is a very successful partnership. The 42 and 72 versions continue to sell well in a market which is still stagnant. My opinion of the 42/500? It is really an ideal aircraft which makes it possible to meet the requirements of the market: Its comfort level is highly competitive and its speed bears comparison with that of more expensive jet aircraft. After all, if this 500 version offers the advantages and qualities I have just mentioned, it is probably because it is derived from versions which were themselves excellent products.

As for the 82, for which we are constantly doing research, it will only be launched if the market is sufficiently buoyant and if it carries a real "plus" for the participating manufacturers in terms of productivity. For the moment it is out of the question to discuss a launch date.

[de Galard] Will the ATR maintenance center, which Alenia Aeronautica has been planning to set up in Venice, be very different from most of the other centers, such as the Avianova center in Naples or the Air Dolomiti center in Trieste?

[D'Angelo] Yes, but I do not want to say more at the moment. What this center and its conditions will have to offer will be likely to spark very great interest. The official announcement of its opening will be made before the end of the year.

[de Galard] What is the situation with regard to Alenia Aeronautica's participation in the production programs of the major American manufacturers?

[D'Angelo] This is the field reserved for our organizational "Air Structures" unit. Alenia Aeronautica manufactures, in Naples, many and varied components of the medium and long-haul airframes produced by McDonnell Douglas and Boeing.

With the prospect of more extensive activity in this field, Alenia Aeronautica has invested heavily in setting up new buildings and industrial facilities at Nola and Foggia, the latter center specializing more in the processing of composite materials. They should become operational toward the end of 1995.

As far as our cooperative links with McDonnell Douglas are concerned, we have already gone further than with other companies. However, we should make it perfectly clear that we have no limitations of an ideological nature!

[de Galard] Is the "Conversions" activity, whether that of the Officine Aeronavali Venezia in Europe or of Dee Howard in the United States, important to Alenia, and will it be developed?

[D'Angelo] It is too soon to say whether it will be developed. However, it is certainly considered important, as the facts show. In Venice, Aeronavali has specialized in converting high-capacity aircraft, which until

then had only carried passengers, into cargo aircraft. This is a "niche" in which we hope to maintain our position.

As for our takeover of Dee Howard, it is proving profitable. The company has again received a new 727 for re-engining.

[de Galard] What is Alenia Aeronautica's policy with respect to alliances?

[D'Angelo] It is extremely simple. For an alliance to be possible, a program or programs must have been defined. To talk of an alliance without linking it with a program is really just verbiage, or even just idle chatter.

### France, Russia To Sign Defense Industry Accord

BR0211130094 Paris AIR & COSMOS/AVIATION  
INTERNATIONAL in French 7 Oct 94 p 14

[Jean-Pierre Casamayou report: "French-Russian Defense Cooperation"]

[FBIS Translated Text] Next month in Paris, the first French-Russian committee will meet to determine joint cooperation activities in the defense industry. Just like the first committee on missiles which has already been created, the aim will be to set up other working groups in various sectors. This is the result of the visit to Russia by Chief Arms Delegate Henri Conze, during which a number of agreements were signed.

An initial agreement signed with Andrey Kokochine, the "arms" official of the Russian Defense Ministry, concerns cooperation and joint activity between the two countries. As a result it covers five areas: joint R&D work; the joint organization and production of new weapons systems or the modernization of already-developed systems; requirements specifications and the supply of military hardware and services; joint marketing of products resulting from joint military production programs; and joint arms recycling programs.

A second agreement signed with the "arms industries committee" (the Goskomoboronprom) cover the following three areas: scientific information exchange in the area of patents, documentation, and technology; scientific seminars and the organization of management training; and institutional and corporate visits.

A number of existing projects have thus been consolidated, and, in particular, various research programs carried out in association with Russian research institutes. These programs, worth several tens of millions of French francs per year, cover, for example, high density circuits, materials, and micro mechanics.

In the industrial domain, this involves cooperation between Matra [Mechanics, Aviation, and Traction Company] and the Russian missile manufacturer Vympel, a project for the modernization of MiG fighters by Thomson or Dassault Electronique, and another project for the modernization of the combat tank by SAGEM [Company for General Applications of Electricity and Mechanics] or

SFIM [Measuring Instruments Manufacturing Company]. It also includes aid from SNECMA [National Company for Aircraft Engine Studies and Construction] and Sextant for the planned MiG-AT trainer, and the modernization of the BM-21 "Grad" rocket-launching system by CELERG, a joint subsidiary of Aerospatiale and the National Explosives Company [SNPE].

### Eurocopter, Mil Moscow, Kazan, Klimov Form Joint Subsidiary for Helicopter Development

BR2810145794 Paris AIR & COSMOS/AVIATION  
INTERNATIONAL in French 7 Oct 94 p 14

[Christel Tardif article: "Creation of Euromil"]

[FBIS Translated Text] Finally, the deed has been done: Eurocopter, Mil Moscow Helicopter Plant, Kazan Helicopter Production Plant, and the Klimov Corporation have finally agreed on the creation of a joint subsidiary. On 29 September in Moscow, almost two years after the official announcement of Eurocopter-Russian cooperation for the development of the Mi-38 [Mil twin-turbine multi-role medium-range helicopter], a 14-tonne helicopter capable of transporting up to 30 passengers, the four groups have finally signed an agreement for the creation of Euromil. This mixed company under Russian law, in which each partner will hold a 25-percent stake, will be assigned the task of developing, industrializing, producing, and marketing the Mi-38, and will also be responsible for the various certification programs.

The principles of sharing in this cooperation are based on studies already done by Mil and on the skills of each helicopter manufacturer. As a result, Mil will be the technical project leader and will be in charge of development. Eurocopter will develop the cockpit, the avionics, and the cabin interior, and will also deal with the customizing and marketing of exported aircraft. Klimov, the aeroengine manufacturer, will be charged with developing the engine, together with its industrialization and production. Lastly, Kazan Helicopter Production Plant will industrialize and produce the helicopter for the part developed by Mil and will deal with customizing and marketing for the domestic market.

Intended for civilian passenger transport, the Mi-38 should come into being before the end of the century. Sales are estimated at 80 percent in Russia and 20 percent in the rest of the world.

**Germany, Japan: NEC Opens Research Park in Germany**

BR0211135894 Rocquencourt ERCIM NEWS in English Oct 94 p28

[Article by Karlheinz Schunk: "NEC Opens a Research Laboratory in the GMD TechnoPark"]

[FBIS Transcribed Text] The Japanese corporation NEC has opened in July 1994 a European research laboratory for parallel computing and communication systems in the new TechnoPark at the German National Research Center for Computer Science, GMD, in Sankt Augustin, near Bonn.

With a workforce of 140,000 and 74 subsidiaries in 28 countries overseas, NEC is one of the world's largest electronics conglomerates. Since opening its first European marketing subsidiary in 1974, NEC has become a major presence on the European market for telecommunication equipment, computers, and semiconductors, and currently operates manufacturing facilities in the United Kingdom and Ireland. After its five research laboratories in Japan and two in Princeton, New Jersey, the new laboratory at the GMD TechnoPark will be NEC's first in Europe.

A 64 processor configuration Cenju-3 system will be installed. It will be used for the main research areas which will include numerical algorithms and applications for parallel processing, joint research with GMD, parallel processing support tools for work towards standardization and multimedia communications systems.

The Cenju-3 will be integrated into an unusually diverse network of parallel computers from Thinking Machines, Meiko, Alliant, and Intel—all of which are already available at GMD through the German Research Network to universities and researchers in the European Union.

GMD's new TechnoPark creates an environment where researchers, product developers, suppliers, and users can coordinate their efforts, thereby accelerating the development of new products and services for a rapidly growing global information market. The TechnoPark is widely seen as an important contribution to the development of a future-oriented economy in the Bonn/Cologne region.

**France: SGS-Thomson Plans Semiconductor Plant in PRC**

BR2010163094 Paris LES ECHOS in French 20 Oct 94 p 11

[Report signed "Ph.L.C.": "Semiconductors: SGS-Thomson To Invest in New Production Plant in China"]

[FBIS Translated Text] The healthy state of the semiconductor industry is beyond doubt. Following 30-percent growth in 1993, global sales should rise by a further 25 percent this year to reach almost 550 billion French francs [Fr]. The expected slowdown has not occurred. It could happen next year, when growth is likely to "decline" by between 12 and 15 percent. For the immediate future, chip manufacturers' order books are full, and their manufacturing plants are operating almost at saturation point. This has been the case with SGS-Thomson for several months, which explains why the Franco-Italian group has decided to open a new production plant.

This investment, to be officially announced during the next few days, will not involve "etching"—the actual production of the silicon components, for which the group will rely on its present factory at Crolles, near Grenoble, and on the one just opening in Phoenix, Arizona. SGS-Thomson's priority is to strengthen its "assembly" capacity for packaging its integrated circuits. The group will follow what is now normal practice by investing in southeast Asia and has forged a partnership with a PRC company. Yesterday, SGS-Thomson declined to elaborate further on the deal.

In parallel, and in accordance with its announcement last May, the Franco-Italian group has started marketing microprocessors under its own name which are compatible with Intel's 486. SGS-Thomson, mindful of its present inadequate production capacity, is restricting deliveries to a limited number of customers. These chips are being manufactured at Carrollton, Texas, where the group is already producing components on behalf of the U.S. company Cyrix. The Phoenix plant will take this over early at the start of 1995, with mass production planned for the spring.

**Micro Market Targeted**

SGS-Thomson is thus seeking to penetrate the consumer market for microcomputers, in which it now has only minimal presence. If the prospects seem sufficiently favorable (Intel forecasts sales of 40 million for the 486 processor this year), the market for Intel-compatible microprocessors will begin to look somewhat crowded, with such companies as AMD, Cyrix, Texas Instruments, and IBM itself already active. However, this competition does not seem to be adversely affecting Intel, whose results reflect its continuing strong performance. During the first nine months of 1994, the world leader in semiconductor sales achieved revenue of \$8.29 billion, with profits reaching \$1.9 billion, representing increases of 29.7 and 12.9 percent respectively.

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